

**REMARKS**

Claims 10, 11, 33, 153, 252, 259, 266 and 270 have been amended. Claims 1-244 and 247-300 are pending in the application.

**Correction of Inventorship**

A Petition to add Jingyue Liu and William Scholle as inventors in the subject application was filed on June 21, 2002. Applicants request that the Examiner report on the status of the Petition in the next communication regarding this application.

**Obviousness-Type Double Patenting**

With respect to the rejection of claims 57, 91, 144, 274 and 292 under the judicially created doctrine of obviousness-type double patenting made in the Office action, applicants note that the subject application and U.S. Patent No. 6,603,039 have been assigned to and are commonly owned. Therefore, any obviousness-type double patenting rejection may be overcome by a timely filed terminal disclaimer in compliance with 37 CFR §1.321(c). Applicants request that the requirement of a terminal disclaimer be deferred until such time allowable subject matter is indicated in the subject application. At that time, a determination can be made as to whether the allowed claims are in conflict and a terminal disclaimer required.

**Claim Objections**

When presented in Amendment C filed March 25, 2002, new claims 252, 259 and 266 contained the symbol "□" whereas the degree symbol (°) was intended. These claims have been amended to correct this word processing error.

**Rejections Under 35 U.S.C. §112, Second Paragraph**

Reconsideration is respectfully requested of the rejection of claims 10, 11 and 117-199 under 35 U.S.C. §112, second paragraph for failing to particularly point out and distinctly

claim the subject matter which applicants regard as the invention.

The present amendments to claims 10 and 11 are submitted as obviating the rejection of these claims.

Claim 117 depends indirectly from independent claim 100 directed to a process for the preparation of N-(phosphonomethyl)glycine (sometimes referred to hereinafter as glyphosate) or a salt thereof including continuously contacting an aqueous feed stream comprising N-(phosphonomethyl)iminodiacetic acid (sometimes referred to hereinafter as PMIDA) or a salt thereof with an oxygen source in a stirred tank reactor of a continuous reactor system and in the presence of a particulate catalyst comprising a particulate carbon support having a noble metal at a surface of the carbon support. On page 3 of the Office action, it is stated that the recitation in claim 117 of "continuously contacting *another* aqueous reaction mixture (sic) containing said product, formaldehyde and formic acid *produced in said first aqueous reaction medium . . .*" makes it unclear whether the claim requires (1) merely reducing oxygen flow later in the process; (2) two separate reactors conducting the same process, but with reduced oxygen flow in one; or (3) something else. Rather than being vague and indefinite, applicants respectfully submit that the Examiner has correctly understood the above-quoted language as encompassing both alternatives (1) and (2) as intended by applicants. That is, the process as defined in dependent claim 117 encompasses both an embodiment wherein the oxygen flow is reduced later in the process (i.e., the first and another aqueous reaction mediums being separated temporally) as well as an embodiment wherein the oxygen flow is reduced in another reactor relative to the oxygen flow in the stirred tank reactor in which the first aqueous reaction medium is contacted with molecular oxygen (i.e., the first and another aqueous reaction mediums being separated spatially). Furthermore, contrary to the assertion in the Office action, the claims depending from claim 117 in fact confirm that such an interpretation of claim 117 is

intended based on claim differentiation. For example, claim 120, which depends indirectly from claim 117, requires that "said another aqueous reaction medium is continuously contacted with molecular oxygen *in another stirred tank reactor* of the continuous reactor system." Accordingly, it is clear that claim 117 reads on both alternatives (1) and (2) and does not necessarily require conducting the process in a continuous reactor system comprising two separate reactors as specified in claim 120.

#### **Rejection of Claims**

##### **100-199, 242-244 and 247 Under 35 U.S.C. §103(a)**

Reconsideration is respectfully requested of the rejections under 35 U.S.C. §103(a) of claims 100-143, 242-244 and 247 as unpatentable over EP 0 019 445 (Nitrokemia) in view of U.S. Patent No. 4,264,776 (Hershman et al.), van Dam et al. (*Journal of Catalysis*, 1991) and U.S. Patent No. 4,624,937 (Chou) and U.S. Patent No. 6,153,753 (Johnson et al.) and of claims 100-199, 242-244 and 247 as unpatentable over Nitrokemia in view of Jalan et al., Itoh et al., Hershman et al., Chou and Johnson et al.

Independent claim 100 is directed to a continuous process for the preparation of N-(phosphonomethyl)glycine or its salts by oxidation of N-(phosphonomethyl)iminodiacetic acid or a salt thereof. More particularly, claim 100 requires, *inter alia*, continuously contacting an aqueous feed stream comprising N-(phosphonomethyl)iminodiacetic acid or a salt thereof with an oxygen source in a stirred tank reactor of a continuous reactor system (i.e., a CSTR) and in the presence of a particulate catalyst comprising a particulate carbon support having a noble metal at a surface of the carbon support.

As acknowledged at the bottom of page 7 of the Office action, Nitrokemia, Hershman et al., van Dam et al. and Chou fail to teach continuous oxidation of N-(phosphonomethyl)iminodiacetic acid or a salt thereof in a stirred tank reactor of a continuous reactor system as called for in independent claim 100. Likewise, Jalan et al. and Itoh et al. contain no such teaching or

suggestion. In order to overcome this shortcoming, the Examiner relies on Johnson et al.

Johnson et al. disclose various reaction schemes for preparing glyphosate which include a carboxymethylation step in which a base pair is reacted with carbon monoxide and an aldehyde source to produce an N-acyl amino carboxylic acid reaction product. In one embodiment, the carboxymethylation reaction product is converted to N-alkyl-N-(phosphonomethyl)glycine (N-substituted glyphosate) which is oxidatively dealkylated in the presence of a noble metal on carbon catalyst to generate glyphosate (See col. 16, line 5 to col. 19, line 24). Although a batch reactor is preferred, it is said that the oxidative dealkylation reaction can be carried out in a continuous stirred tank reactor, although preferably (1) there is sufficient contact between the oxygen, N-substituted glyphosate reactant and the catalyst; and (2) there is adequate retention time for substantial conversion of the N-substituted glyphosate reactant to glyphosate (See col. 19, lines 7-15).

Notably, in the structural formula presented in column 16 of Johnson et al.,  $R^{21}$  and  $R^{22}$  are defined so as to **exclude** N-(phosphonomethyl)iminodiacetic acid (PMIDA) and its salts from the definition of the N-alkyl-N-(phosphonomethyl)glycine reactant fed to the oxidative dealkylation step (i.e.,  $R^{21}$  and  $R^{22}$  may be hydrocarbyl or unsubstituted hydrocarbyl **other than**  $-CO_2H$ ). Thus, contrary to the assertion at the top of page 8 of the Office action, the cited text of Johnson et al. does not disclose preparation of glyphosate from PMIDA in continuous stirred tank reactors. Although the oxidative cleavage of N-(phosphonomethyl)iminodiacetic acid to produce glyphosate is part of several of the disclosed reaction schemes (See, for example, Reaction Scheme 6 in col. 21-22), the teaching in the text of Johnson et al. cited in the Office action concerning use of a continuous stirred tank reactor is limited to the oxidative dealkylation of N-substituted glyphosate reactants other than N-(phosphonomethyl)iminodiacetic acid or its salts. Accordingly,

Johnson et al. cannot overcome the deficiencies of the other cited references with respect to claim 100.

**Statements Concerning Common Ownership**

Johnson et al. qualifies as prior art against the subject application under 35 U.S.C. §102(e). Although the subject application was originally filed on September 29, 1999, in response to the Office action mailed June 18, 2002, applicants filed a Request for a Continuation Prosecution Application (CPA) under 37 CFR 1.53(d) on December 18, 2002.<sup>1</sup> Accordingly, the disqualification of prior art under 35 U.S.C. §103(c)/§102(e) with respect to commonly owned subject matter applies in the subject application (See MPEP 706.02(1)(1)). Moreover, the undersigned attorney states that the subject application and U.S. Patent No. 6,153,753 were, at the time the claimed invention was made, owned by, or were subject to an obligation of assignment to, Monsanto Company such that the disclosure in Johnson et al. cannot preclude patentability under 35 U.S.C. §103. In the absence of Johnson et al., a *prima facie* case of obviousness with respect to claim 100 is lacking.

Accordingly, in view of the above, applicants respectfully submit that the invention as defined in claims 100-199, 242-244 and 247 is patentable over the asserted combinations of Nitrochemia, Hershman et al., van Dam et al., Chou, Jalan et al., Itoh et al. and Johnson et al.

The disclosure in Johnson et al. of using continuous stirred tank reactor in the oxidative dealkylation of certain N-substituted glyphosate reactants **other than N-(phosphonomethyl)iminodiacetic acid or its salts** is similar to the disclosure found in U.S. Patent No. 6,005,140 (Morgenstern et al.) previously made of record and considered by the Examiner

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<sup>1</sup> With respect to the statements at the top of page 2 of the Office action, it is unclear to what correspondence in the prosecution history the Examiner is referring. In any event, the Office action mailed June 18, 2002 was non-final and in response thereto applicants filed a CPA under 37 CFR 1.53(d), not an RCE under 37 CFR 1.114.

(See, for example, col. 10, lines 31-39 of U.S. Patent No. 6,005,140).

Morgenstern et al., like Johnson et al., qualifies as prior art against the subject application under 35 U.S.C. §102(e). However, no rejection of the subject matter defined in claims 100-199, 242-244 and 247 has been made in the Office action based on the disclosure in Morgenstern et al. Nevertheless, the undersigned attorney states that the subject application and U.S. Patent No. 6,005,140 were, at the time the claimed invention was made, owned by, or were subject to an obligation of assignment to, Monsanto Company such that the disclosure in Morgenstern et al. likewise cannot preclude patentability under 35 U.S.C. §103.

#### **Supplemental Information Disclosure Statement**

\* In the accompanying Supplemental Information Disclosure Statement, applicants have submitted copies of International Publication No. WO 98/35930 (corresponding to Johnson et al., U.S. Patent No. 6,153,753) and International Publication No. WO 99/41260 (corresponding to Morgenstern et al., U.S. Patent No. 6,005,140) for consideration of their applicability and relevance, if any, under 35 U.S.C. §102/§103.

#### **Rejection of Claims**

##### **1-99, 200-241 and 248-300 Under 35 U.S.C. §103(a)**

Reconsideration is respectfully requested of the rejection of claims 1-34, 49-52, 200-229, 248-251, 256-258, 263-265, 270, 271, 288 and 289 under 35 U.S.C. §103(a) as unpatentable over EP 0 019 445 (Nitrokemia) in view of U.S. Patent No. 4,264,776 (Hershman et al.), van Dam et al. (*Journal of Catalysis*, 1991) and U.S. Patent No. 4,624,937 (Chou).

Independent claims 1, 13, 23, 49, 248, 256, 263 and 288 are directed to processes for the catalytic oxidation of a reagent in a mixture by contacting the reagent with an oxidation catalyst in the presence of oxygen wherein the oxidation catalyst comprises a noble metal at the surface of a carbon support. In claims 1, 13, 23 and 49 the reagent is N(phosphonomethyl)iminodiacetic acid

(PMIDA) or a salt thereof oxidized to produce N-(phosphonomethyl)glycine (glyphosate) or a salt thereof.

The noble metal on carbon catalyst utilized in the claimed oxidation processes is required to exhibit what applicants refer to as "deeply reduced" characteristics. Applicants have discovered that, by use of such deeply reduced catalysts satisfying the various characterizing standards set forth in the claims, reagents such as PMIDA or salts thereof can be effectively oxidized without undue loss of noble metal from the carbon support in the course of a catalytic oxidation reaction, particularly when conducted in an aqueous medium capable of solubilizing a noble metal. The improved resistance to solubilization of the noble metal provided by using a deeply reduced catalyst in accordance with the present invention overcomes a significant obstacle which has previously compromised the economic feasibility of using a noble metal on carbon support to catalyze oxidation reactions. Use of a deeply reduced noble metal on carbon catalyst in the oxidation of PMIDA or a salt thereof provides for substantially quantitative oxidation to glyphosate or its salts and effective oxidation of the C<sub>1</sub> by-products of the reaction (formaldehyde and formic acid) to be maintained for a prolonged period and/or over numerous oxidation cycles without the excessive loss of noble metal as is otherwise typically encountered in acidic aqueous oxidation media.

The deeply reduced noble metal on carbon catalyst used to catalyze the oxidation reaction in independent claims 1 and 248 is characterized as yielding no more than about 1.2 mmole of carbon monoxide per gram of catalyst when a dry sample of the catalyst, after being heated at a temperature of about 500°C for about 1 hour in a hydrogen atmosphere and before being exposed to an oxidant following the heating in the hydrogen atmosphere, is heated in a helium atmosphere from about 20 to about 900°C at a rate of about 10°C per minute, and then at about 900°C for about 30 minutes. In an alternative characterization, the deeply reduced catalyst employed in the processes defined in independent claims 13 and 256 comprises a carbon support having a noble

metal, carbon and oxygen at a surface of the carbon support and has a ratio of carbon atoms to oxygen atoms of at least about 20:1 at the surface as measured by x-ray photoelectron spectroscopy after the catalyst is heated at a temperature of about 500°C for about 1 hour in a hydrogen atmosphere and before the catalyst is exposed to an oxidant following the heating in the hydrogen atmosphere. The characterization of the deeply reduced catalyst in independent claims 23 and 263 is similar to that set forth in independent claims 13 and 256 except that the requisite high C/O atomic ratio is measured in a surface layer having a thickness of about 50 Å as measured inwardly from the surface of the catalyst.

To provide a catalyst which gives such a low carbon monoxide desorption yield and/or exhibits such a high C/O atomic ratio at the surface of the carbon support, the catalyst is "deeply reduced" utilizing the catalyst preparation techniques described in the specification and particularly the working examples of the application. Applicants teach a variety of stratagems that may be employed to obtain a deeply reduced catalyst as claimed, including deoxygenating the carbon support prior to noble metal deposition, depositing the noble metal in one of its more reduced oxidation states (e.g., elemental platinum or a salt of Pt(II) instead of a salt of Pt(IV)) and reducing the surface of the catalyst after noble metal deposition by heating the surface (e.g., most preferably at temperatures of from about 550 to about 900°C) in a non-oxidizing environment (e.g., nitrogen, argon and helium) and/or exposing the surface to a reducing environment (e.g., formaldehyde, formic acid, amines, ammonium ions, and sodium borohydride (NaBH<sub>4</sub>)) or a gas-phase reducing agent (e.g., hydrogen, ammonia and carbon monoxide). The stratagem of utilizing a sufficiently deoxygenated carbon support prior to noble metal deposition is specifically called for in independent claims 49 and 288 which require that before noble metal deposition, the carbon support have carbon and oxygen at the surface of the carbon support in amounts such that the ratio of



carbon atoms to oxygen atoms at the surface is at least 20:1 as measured by x-ray photoelectron spectroscopy.

Nitrokemia discloses a process for preparing glyphosate by batch oxidation of an aqueous mixture of PMIDA substrate with oxygen in the presence of a noble metal on carbon catalyst. The charge mixture initially contains particulate PMIDA suspended in an apparently saturated aqueous solution thereof, the total initial concentration of PMIDA in the suspension being at least 7 g PMIDA per 100 ml water. Nitrokemia fails to teach reducing the catalyst much less utilizing a catalyst exhibiting the requisite maximum carbon monoxide desorption yield and/or minimum carbon to oxygen atom surface ratio as called for in the instant claims.

Hershman et al. disclose catalytic oxidation of tertiary amines in the presence of an activated carbon catalyst to produce secondary amines. Activation of the carbon catalyst may be achieved by heating the carbon to high temperatures (e.g., 800-900°C) with steam or carbon dioxide (See col 4, lines 53-57). In addition to the activated carbon catalyst, Hershman et al. teach the use of other oxidation catalysts including noble metal on the carbon deposited from a solution of chloroplatinic acid upon addition of sodium borohydride followed by acidification with hydrochloric acid (See col. 8, lines 10-14). However, Hershman et al. clearly discourage the use of noble metal on carbon catalyst noting the noble metal leaching problem underlying the development of the claimed invention. More particularly, Hershman et al. teach that the expensive noble metals tend to be leached out of carbon along with the amine reactants or product in isolation or other procedures prior to recycling catalyst to a reactor and this tends to negate any advantage in use of noble metal on carbon catalysts (See col. 8, lines 3-8).

van Dam et al. disclose techniques for preparation of platinum on activated carbon catalysts and make reference to the use of platinum on carbon in heterogenous catalysis of liquid phase reactions including oxidations. A carbon carrier is impregnated using an aqueous solution of hexachloroplatanic acid followed by reduction of the resulting impregnate. In the

Introduction section, a reduction method used in the preparation of platinum on carbon catalysts that includes treatment with hydrogen gas at elevated temperature (e.g., 400°C) is briefly mentioned without giving any details or objectives of such treatment (See page 336). However, rather than a method using hydrogen gas, van Dam et al. teach a liquid phase reduction method performed by contacting the wet platinum impregnate with a hydrogen donor or reductor (e.g., formaldehyde, methanol, potassium formate and dissolved hydrogen) in alkaline aqueous solutions at ambient temperatures and controlled pH. Formaldehyde in diluted aqueous media is principally present as methylene glycol (See pages 336, 338 and 343). A model of the chemistry involved in the platinum adsorption/impregnation ( $\text{Pt}^{\text{IV}} \rightarrow \text{Pt}^{\text{II}}$ ) and subsequent reduction ( $\text{Pt}^{\text{II}} \rightarrow \text{Pt}^0$ ) is set forth in Scheme I (See page 341).

Chou discloses a process for oxidation of a tertiary amine such as PMIDA in the presence of an activated carbon catalyst and oxygen to produce glyphosate. Chou's activated carbon catalyst can be prepared by a two-step process said to remove oxides from the surface of the carbon and which includes subjecting the carbon to an oxidizing agent (e.g., nitric acid,  $\text{CrO}_3$ ,  $\text{H}_2\text{O}_2$ , hypochlorite,  $\text{H}_2\text{O}$ ,  $\text{H}_2\text{O}/\text{NH}_3$ ,  $\text{CO}_2$ ,  $\text{NO}_x$ , air, oxygen, etc.) at temperatures of from about 50°C to about 500°C followed by pyrolysis, preferably in an inert atmosphere, at a temperature in the range of about 500°C to 1500°C. Alternatively, the treatment can be accomplished by simultaneously pyrolyzing the carbon material in the presence of  $\text{NH}_3$  and an oxygen-containing gas (e.g.,  $\text{NO}_x$ ,  $\text{O}_2$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{SO}_2$ , and mixtures of such gases) that will react with the oxides on the surface of the carbon at the pyrolyzing temperatures.

On page 6 of the Office action, the Examiner asserts that it would have been obvious to prepare glyphosate with a reduced catalyst comprising a noble metal on carbon, wherein the reduced catalyst would be produced by the process taught by the combination of Hershman et al., van Dam et al. and Chou.

Initially, applicants note that there is no basis or motivation to combine the teachings of Chou with the disclosure in Hershman et al. or van Dam et al. or, for that matter, the primary reference, Nitrokemia. Importantly, unlike Nitrokemia, Hershman et al. and van Dam et al., Chou does **not** teach or suggest the use of an oxidation catalyst comprising a noble metal on a carbon support. Accordingly, the Examiner's statement bridging pages 5-6 of the Office action that Chou discloses a protocol for the activation of a carbon "support" surface mischaracterizes the teaching of this reference. The catalyst used in the process of Chou is the activated carbon produced by the methods disclosed therein and there is no teaching or motivation provided in the reference of utilizing the activated carbon as a support for a noble metal as called for in the instant claims. Nothing in the disclosure of Chou suggests the use of a noble metal on carbon catalyst, as called for in all the pending claims, much less a the use of a deeply reduced noble metal on carbon catalyst as claimed. Since the oxidation catalyst used in Chou's process consists entirely of carbon, the problems presented in preparation and use of the carbon catalyst differed from the problems presented in developing a noble metal catalyst in which carbon provides a support for the noble metal. By way of significant example, Chou's process was not confronted with the problem of noble metal dissolution. Moreover, nothing in the disclosure of the other cited references would have motivated one of ordinary skill in the art to look to the teachings of Chou to solve the problem of noble metal leaching. Particularly, Hershman et al.'s teaching that the problem of noble metal leaching negates any advantage of using a noble metal on carbon catalyst as compared to a carbon only catalyst would have suggested to one skilled in the art to use Chou's less expensive activated carbon only catalyst as an effective alternative to avoid catastrophic noble metal loss.

Moreover, contrary to the assertion on page 6 of the Office action, a person practicing the catalyst preparation techniques disclosed by Hershman et al. and van Dam et al. would **not**

necessarily obtain the "deeply reduced" characteristics of maximum carbon monoxide desorption yield and/or C/O surface ratio recited in independent claims 1, 13, 23, 49, 248, 256, 263 and 288. Hershman et al. and van Dam et al. fail to provide any basis for the discovery that deeply reduced noble metal on carbon catalysts exhibiting the claimed characteristics would substantially reduce metal loss and would be commercially effective for the conversion of reagents such as N-(phosphonomethyl)iminodiacetic acid to glyphosate with minimal loss of noble metal.

Accordingly, in view of the above, applicants respectfully submit that the process as defined in independent claims 1, 13, 23, 49, 248, 256, 263 and 288 and the claims depending therefrom are patentable over Nitrokemia, Hershman et al., van Dam et al. and Chou.

Independent claims 33 and 270 have been amended to further require that the noble metal on carbon catalyst contacting PMIDA or other reagent further comprise a promoter deposited at the surface of the carbon support. Nothing in the disclosures of Nitrokemia, Hershman et al., van Dam et al. or teach or suggest an oxidation catalyst comprising a noble metal and a promoter. Accordingly, applicants respectfully submit that the process as defined in independent claims 33 and 270 and claims 34 and 271 depending therefrom are patentable over Nitrokemia, Hershman et al., van Dam et al. and Chou.

Reconsideration is respectfully requested of the rejection of claims 1-99, 200-241 and 248-300 under 35 U.S.C. §103(a) as unpatentable over Nitrokemia in view of U.S. Patent Nos. 4,186,110 (Jalan et al.) and 5,876,867 (Itoh et al.), Hershman et al. and Chou.

Jalan et al. disclose catalyst preparation including alloying noble metals (e.g., platinum) supported on carbon with a "refractory metal" (e.g., tungsten, aluminum, titanium, silicon, cerium) by heating an intimate mixture of supported noble metal particles and refractory metal oxide to at least about 600°C usually in a reducing atmosphere (See col. 5, line 51 to col. 6,

line 29). Jalan is directed primarily, if not exclusively, to fuel cell electrocatalysts. However, as noted on page 9 of the office action Jalan includes the non-specific statement that the catalyst "finds application not only in fuel cell electrodes but also in the chemical, pharmaceutical, automotive and anti-pollution fields" (See col. 3, line 67 to col. 4, line 1). Jalan further discloses that the noble metal alloys may be used in applications other than acid fuel cells such as catalysts for base fuel cells, chemical and pharmaceutical processes and automotive and anti-pollution devices (See col. 8, lines 33-40).

Itoh discloses electrocatalyst preparation similar to that of Jalan including alloying supported noble metals with a base metal (e.g., gallium, vanadium, chromium, manganese, iron, cobalt, nickel, and copper) at elevated temperatures (e.g., 750°C to 1000°C) in a stream of hydrogen (See col. 5, lines 30-35).

The Examiner relies on the teachings of Jalan and Itoh with respect to claims calling for high temperature treatment of the catalyst following noble metal deposition (claims 33-48 and 270-287) and claims requiring a promoter along with the noble metal at the surface of the carbon support (claims 33, 53-99, 230-241, 252-255, 259-262, 266-282 and 290-300).

Applicants respectfully submit that motivation to combine the teachings of Jalan et al. or Itoh et al. directed largely to electrocatalysts for fuel cell applications with Nitrokemia and modify the teachings of the primary reference is wholly lacking. The vague statements in Jalan regarding use in the "chemical field" or "chemical processes" is so non-specific as to be virtually meaningless and certainly would not motivate one skilled in the art to combine the reference teaching with the disclosure in Nitrokemia regarding oxidative cleavage of a PMIDA reagent. Furthermore, Itoh et al. does not contain any teaching of using the disclosed electrocatalysts in any application other than electrodes.

On page 10 of the Office action, in response to applicants previous argument, the Examiner attempts to further justify combination of Jalan et al. and/or Itoh et al. with Nitrokemia

and the other references on the basis of the purported teaching that the noble metal alloy electrocatalysts exhibit improved acid resistance and thus address the noble metal leaching problem recognized by Hershman et al. Applicants note that there is a brief mention in the background of Jalan that "all base metals, including the refractory metals, are notoriously susceptible to dissolution at the cathodes in acid fuel cells, and it is not believed that alloys of noble metals **with base metals** have ever been considered for use at cathodes for that reason" (See col. 2, lines 50-55). However, this statement refers to the problem of the dissolution of base metals, not the noble metal with which the base metals or refractory metal oxides are alloyed. Itoh et al. also makes reference to the problem of **base metal leaching** in acid fuel cells, whether or not the base metal is alloyed with the noble metal (See col. 2, lines 10-25). In any event, applicants have not found any teaching in Jalan et al. or Itoh et al. (including the abstract and columns 2-3 of Itoh et al. cited at the top of page 10 of the Office action) that the disclosed noble metal alloy electrocatalysts exhibit greater resistance to **noble metal** leaching.

In view of the above, applicants respectfully submit that a *prima facie* case of obviousness is lacking with respect to the combination of Jalan et al. and/or Itoh et al. with Nitrokemia, Hershman et al. and Chou such that the invention defined in claims 1-99, 200-241 and 248-300 is patentable over these references.

### Conclusion

In view of the above, favorable reconsideration and allowance of all pending claims are respectfully solicited.

Applicants request an extension of time to and including June 2, 2004 for filing a response to the above-mentioned Office action.

A check in payment of the applicable extension fee and the fee for submission of an Information Disclosure Statement under 37 CFR 1.17(p) is enclosed.

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MTC 6610 (39-21(3631)D)  
PATENT

The Commissioner is requested to charge any fee deficiency  
in connection with this amendment to Deposit Account No. 19-1345.

Respectfully submitted,



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\*Enclosures

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